

## Original Article

# An *in-vitro* evaluation of anthelmintic activity of *Morus alba* bark

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### ABSTRACT

Different extracts of *Morus alba* bark were taken for anthelmintic activity against Indian earthworm *Pheretima posthuma*. Three concentrations (2, 4, and 10 mg/ml) of various extracts were tested and results were expressed in terms of time for paralysis and time for death of worms. Piperazine hydrate (2 and 4 mg/ml) was used as reference standard and normal saline as control group. Dose dependent activity was observed in the plant extracts but hydroalcoholic extract exhibited more activity as compared to others. The anthelmintic activity of *Morus alba* bark extract has therefore been demonstrated for the first time.

## 1. INTRODUCTION

Helminthes infections, repeatedly entitled helminthiasis are among the most pervasive infection and a foremost degenerative disease distressing a large proportion of world's population. In developing countries, they pose a large threat to public health and contribute to the prevalence of malnutrition, anemia, eosinophilia and pneumonia [1]. The helminths parasites mainly subsist in human body in intestinal tract, but they are also found in tissue, as their larvae migrate towards them [2]. Most diseases caused by helminths are of a chronic, debilitating nature; they probably cause more morbidity and greater economic and social deprivation among humans and animals than any single group of parasites.

Chemical control of helminthes coupled with improved management has been the important worm control strategy throughout the world. However, development of resistance in helminthes [3, 4] against conventional anthelmintics is a foremost problem in treatment of helminthes diseases [5, 6]. Henceforth it is important to look for alternative strategies against gastrointestinal nematodes, which have led to the proposal of screening medicinal plants for their anthelmintic activity.

*Morus alba* bark commonly called Shahtut is a member of Moraceae family. The plant is widely distributed throughout India. The leaves of plant used as analgesic, anthelmintic (expels parasitic worms), antibacterial, antifungal, antioxidant, antitussive (suppresses cough), asthma, astringent, bronchitis, cancer, colds,

cosmetic, diabetes, diaphoretic (promotes sweating), diuretic (increases urine flow), edema (swelling), expectorant (expels phlegm), eye infections, flavoring, food uses, hair tonic (premature graying), hypertension (high blood pressure), influenza, kidney function, laxative, liver disorders, lymphatic disorders (elephantiasis), mouth and throat inflammation, nosebleeds, ophthalmologic uses, pulmonary conditions, rheumatism, sedative, skin care (emollient), sore throat, spleen disorders, tetanus, tinnitus, tonic, toothache, urinary incontinence [7,8]. Keeping in mind such outstanding properties exhibited by the plant, the present study was intended to investigate anthelmintic activity of aqueous, ethanolic and hydroalcoholic extracts of *Morus alba* bark in Indian earthworm.

## 2. MATERIAL AND METHOD

### 2.1. Plant material and extraction

Bark of *Morus alba* was collected from the forest of Manduwala, Dehradun and authenticated by Mr. S. K. Srivastava, Department of Botanical Survey of India, Dehradun, U.K. The roots of Coleus dried, crushed in motor pestle and passed through sieve no. 44 and then extracted by water, ethanol and hydroalcoholic solution by cold maceration process. Then extract was filtered and filtrate evaporated to dryness. Finally the crude extract was collected and its % yield was calculated. Phytochemical screening

was carried out to assess the presence of phytoconstituents in the extracts.

## 2.2. Experimental Worms

All the experiments were carried out in Indian adult earthworms (*Pheretima posthuma*) due to its anatomical resemblance with the intestinal roundworm parasites of human beings. They were collected from moist soil and washed with water to remove all fecal matter.

## 2.3. Administration of Piperazine Hydrate

Piperazine hydrate (2 and 4 mg/ml) was prepared by using normal saline as per method of extract.

## 2.4. Administration of Extract

The suspension of aqueous, ethanolic and hydroalcoholic extracts of *Morus alba* bark of different concentration (2, 4 and 10 mg/ml) were prepared by using normal saline and final volume was made up to 10 ml for respective concentration. Piperazine hydrate was used as standard. Groups of approximately equal size worms consisting of two earthworms individually in each group were released into in each 10 ml of desired concentration of drug and extracts in the petri dish.

## 2.5. Experimental Design

The anthelmintic activity was performed according to the method [9]. On adult Indian earth worm *Pheretima posthuma* as it has anatomical and physiological resemblance with the intestinal round worm parasites of human beings. *Pheretima posthuma* was placed in petri dish containing three different concentrations (2, 4 and 10 mg/ml) of aqueous, ethanolic and hydroalcoholic extracts of bark of *Morus alba*. Each petridish was placed with 2 worms and observed for paralysis or death. Mean time for paralysis was noted when no movement of any sort could be observed, except when the worm was shaken vigorously; the time death of worm (min) was recorded after ascertaining that worms neither moved when shaken nor when given external stimuli. The test results were compared with reference compound Piperazine hydrate (2 and 4 mg/ml) treated samples.

## 3. RESULTS AND DISCUSSION

Preliminary phytochemical analysis of all three extracts showed the presence of flavonoids, saponins, tannins, steroids, terpenoids and alkaloid whereas aqueous revealed the tannins, steroids and alkaloid active phytoconstituents. The data revealed that the aqueous extract showed anthelmintic activity at a concentration of 10 mg/ml, whereas the hydroalcoholic extract also showed paralysis and death at similar concentrations. The other test concentrations of all three extracts showed marked degree of anthelmintic activity. The anthelmintic effect of extracts is comparable with that of the effect produced by the standard drug Piperazine hydrate. Parasitic helminths affect animals and man, causing considerable hardship and stunted growth. Hundreds of millions if not billions of human infections by helminthes exist

worldwide and increased world travel and immigration from the developing countries. However tremendous advances has been made during the previous decade and substantial number of synthetic precursors have been derived to cope up the damage caused by parasite, but unfortunately no effective medicine has been developed so far. Moreover the problems associated with the use of such drugs like some serious side effects and development of resistance drives the severity of infection to the next level. These factors paved the way for herbal remedies as alternative anthelmintics. Evaluation of activities of medicinal plants claimed for possessing the anthelmintic property is getting the attention these days. Screening and proper evaluation of the claimed medicinal plants could offer possible alternatives that may be both sustainable and environmentally acceptable. The results of this study have shown promising anthelmintic activity suggesting the possible use of *Morus alba* bark extracts in intestinal nematode control. The anthelmintic activity of aqueous extract could be due to the presence of constituents.

The present study suggested that the hydroalcoholic extract was more effective than the other extracts, even though all the extract were endowed with anthelmintic property. The activity was concentration dependent of the different extracts. The activity of the extracts was found to be inversely proportional to the time taken for paralyze / death of the earth worms.

**Table 1.** Effect of various concentration of all three extract of *Morus alba* bark.

S. No.	Treatment	Concentration mg/ml	Time taken for paralysis (in mins)	Time taken for death (in mins)
1.	Control (normal saline)	-	No paralysis	No death
2.	Piperazine hydrate	2	31	72
		4	21	68
3.	Aqueous extract of <i>Morus alba</i>	4	68	126
		8	65	123
		10	63	120
4.	Ethanolic extract of <i>Morus alba</i>	4	68	129
		8	64	125
		10	60	124
5.	Hydro-alcoholic extract of <i>Morus alba</i>	4	60	128
		8	55	125
		10	52	123

## 4. CONCLUSION

The results of the present study clearly indicated that the crude aqueous extract of *Morus alba* bark did produce anthelmintic activity against Indian earthworm *Pheretima posthuma*. The plant possesses significant anthelmintic activity at 10 mg/ml concentration measured by time taken for paralyze / death of the

earth worms. The current investigation leads to conclusion that the bark of *Morus alba* have potent anthelmintic activity when compared with the conventionally used drug. The results did not, however, exclude the possibility that doses of the extract with lower anthelmintic activity in this study might be efficacious against other species of helminths. Further studies using in vivo models and to isolate active constituents from extract are required to carry out and established the effectiveness and pharmacological rational for the use of *Morus alba* bark as an anthelmintic drug.

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